CHILTON'S

AUTOMOTIVE INDUSTRIES

DECEMBER 1990

IS FORD SLIPPING?

THE PEOPLE — THE PRODUCT — THE PROCESS

HONDA'S TOUR DE FORCE

1991 Acura NSX

AUTOMOTIVE INDUSTRIES ANNUAL ENGINEERING AWARD

Acura's NSX takes the prize. Page 30.

Volume 170, No. 12 December 1990

CHILTON'S AUTOMOTIVE INDUSTRIES

COVER STORY

NSXcellent! 30
We pick the standout engineering effort for 1990.

DEPARTMENTS

5 Editorial
9 Harbour
11 Keller
17 Newsline
20 Strictly Business
26 Cars Worth Noting
71 Letters
72 Windecker

FEATURES

Riding the Rollercoaster 37
Are Ford's recent downturns shades of the future?

1990 SAE Convergence Show 42
Gurus speak, conventioneers seek.

Jewel In The Crown 48
See how Mitsubishi's Diamante glitters.

Heavy Metal No More 51
Lighter engine blocks from cast iron?

Shopping For Suppliers 54
Nissan's design VP reveals his supplier wish list

Cutting Dies Quickly 56
Toyota's manufacturing answer to the Ginsu knife.

IVHS America 60
Meet AI's new columnist, IVHS expert Jim Haugen.

TECH TOPICS

From Whole Cloth 61
Changing fabrics at the touch of a button.

TRUCK & OFF-HIGHWAY INDUSTRIES

(Not found in all issues.)

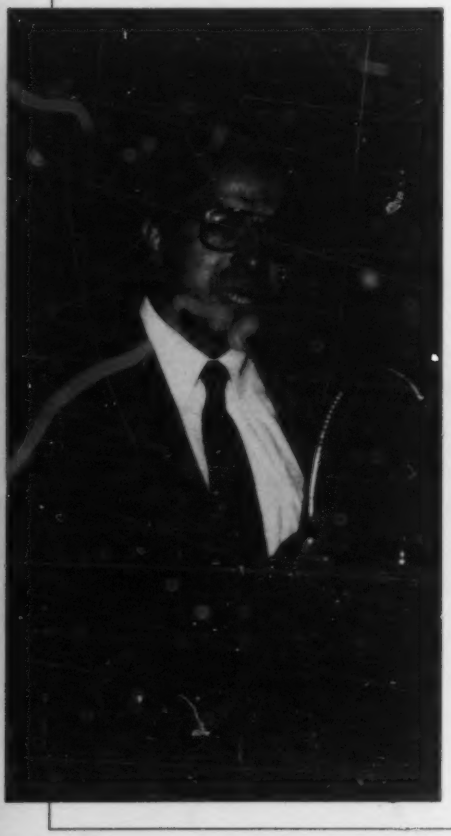
Unanswered Questions T-4
IVHS for the heavies.

AUTOMOTIVE INDUSTRIES (ISSN 0273-656X) magazine is published monthly by Chilton Co., Chilton Way, Radnor, PA 19089. Chilton Company is a division of Capital Cities ABC, Inc., New York, NY. Subscription rates: 1 yr. $49.95 US, $100.00 foreign. Phone (215) 964-4152. Second Class Postage paid at Wayne, PA 19087 and additional mailing offices. POSTMASTER: Send address changes to AUTOMOTIVE INDUSTRIES, Circulation Dept., Chilton Way, Radnor, PA 19089. Permission to photocopy for internal use or the internal use of specific clients is granted by Chilton Company for libraries and other users registered with the Copyright Clearance Center (CCC), provided that a base fee of $1.00 per copy of the article, plus 25¢ per page is paid to the CCC, 21 Congress St., Salem, MA 01970. Address special requests to The Editor. (0273-656x/85 $1.00 + 25¢)

CHILTON COMPANY
ONE OF THE
CAPITAL CITIES/
ABC PUBLISHING COMPANIES
DIVERSIFIED PUBLISHING
GROUP
ROBERT G. BURTON
PRESIDENT

1990 SAE CONVERGENCE SHOW

Good things come in small packages, they say. And that certainly applied to the SAE's Convergence Show on automotive electronics. Though small – total attendance was 3300 people – it was the kind of show where you could see everything, whether attending technical conferences, touring exhibits, or catching the keynote speeches. Just in case you didn't make the show, here are some of the highlights.



Harold Poling
Chairman, Ford Motor Co.

Ford's chairman, "Red" Poling (right), predicts that on-board electronics will become totally integrated by the late 1990s. After that, he says, will come the electronic integration of the car to its environment, where cars will virtually drive themselves. "For a guy who's first car was a Model A, when the hottest option going was the quail radiator cap, this is pretty amazing," Poling said.

Other electronic-related news from Poling:

- *Ford is building more dynamometers in the US, UK and Germany to prove out electronic powertrain and chassis systems more quickly.*
- *Ford is expanding its scientific research lab in Dearborn to develop silicon-based sensors.*
- *Ford, Mazda and Sanyo will form a joint venture to design, develop and manufacture automotive audio products. Ford will get radios for vehicles primarily sold in the Asia-Pacific region.*

Poling called for the industry to develop a multiplexing standard. And he noted the need to coordinate IVHS activities in the US, Europe and Japan to eliminate duplication of effort – especially to avoid wasting engineering talent, which is in critically short supply worldwide.

George Fisher
Chairman & CEO, Motorola

The most oft-heard phrase at Convergence 1990 was "time to market." Motorola believes rapid response to market needs is critical for success. "We need to do business in a world without boundaries," says Motorola's chairman George Fisher (left).

If you overspend your budget 50% to bring a new product out six months early, he says, it will only hurt pre-tax profits by three to four percent. On the other hand, he claims, if you hit your budget but come out six months to one year late, pre-tax profits can fall by as much as 33%.

Fisher used a pager factory Motorola has in Florida as an example of how it is geared to respond quickly to customer orders. Within 17 minutes of receiving an order, a bar code with all the customer's requirements is being affixed to a printed circuit board. Two hours later, it's being shipped.

"Why not have a car with custom features that can be delivered to the customer in less than one week?" Fisher asked. "Those possibilities are not out of the realm of possibility." The problem is getting rid of the bureaucracy and paperwork.

(P.S. Motorola is not a new name to the auto industry. The company started making radios for automobiles in the 1930s. In fact, the company's name comes from a combination of "motor car" and "Victrola.")

Allesandro Barberis
President & CEO, Magneti Marelli

Who has the best automotive electronic technology? Alleasandro Barberis (left) divulged his company's competitive assessment of where the Japanese, Americans and Europeans stand.

In powertrains, he admitted the Europeans trail both the Americans and Japanese. The reason is that European emission controls have not been as stringent as they are in the US or Japan. But that will change soon, he said.

In the area of safety and controls the Europeans are also behind because their approach is through active, not passive safety (such as airbags).

Europe also lags behind in electronic entertainment and communications. But in the area of electronic temperature control, Europe is coming on strong. And when it comes to Prometheus-type technology, he says Europe is even with Japan and ahead of the US.

Overall, Barberis said Europe owes a great debt to the US and Japan in the area of semiconductors. In memory devices he rates Japan as best; the US in microprocessors; the Europeans in smart power, sensors and actuators.

Despite Europe's debt to the US and Japan, Barberis believes Europe is catching up fast. He is especially bullish about the European government sponsored program, called JESSI, for common R&D in sub-micron technologies. And European companies will short-cut the catch-up process with technical agreements with Japanese companies, he predicts.

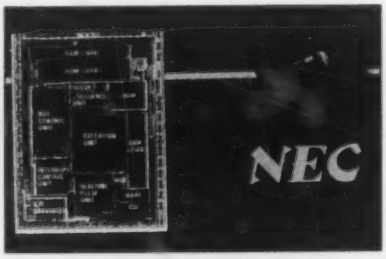
Koji Kobayashi
Chairman Emeritus, NEC

Compared to the recent past, we now live in a world of "no inconveniences," says Dr. Kobayashi (below). He reminisced that as plant manager of NEC's largest telephone manufacturing plant in Japan in the late 1940s, he didn't even have a telephone in his own home.

Dr. Kobayashi believes that the industry will soon be turning to satellite technology to locate a car's position, control traffic, and locate the nearest available parking space. He believes the automatic location of parking spaces will be available in 10 years.

NEC K-3 Series Semiconductor

NEC introduced its 16-bit K-3 series semiconductor (above right) at Convergence. The company claims its unique architecture makes this chip ideal for ABS, traction control, even engine control – though NEC doesn't expect the latter to find any application in the US.



The K-series features what NEC calls a peripheral management unit (PMU). Most chips spend 80% to 90% of their time transferring input/output information, says NEC, creating an I/O bottleneck. But on the K-series, the PMU handles the transfer of information. This means the CPU only spends 30% of the time transferring information, allowing it to run faster. In turn this means more peripherals can be added, allowing the CPU to process more data – up to 55 I/O ports.

The K-3 series has an 8-bit external bus. NEC says this chip would allow an automaker to put all of its chassis controls onto one chip.

The PMU is etched right into the silicon, so it reduces system cost by eliminating discreet ICs. In 10,000 piece orders the price of the K-3 is $10 to $15 per chip. Sometime in 1991 NEC will begin manufacturing the chip at its Roseville, CA lab.

NEC is also expected to introduce its K-6 series in the near future. The 16-bit chip, with its 16-bit bus will get close to DSP capabilities, the company claims. It will primarily be aimed at engine controllers and will be priced at $15 to $20 per chip in 10,000 order quantities.

Nagayuki Marumo
Executive Managing Director, Nissan

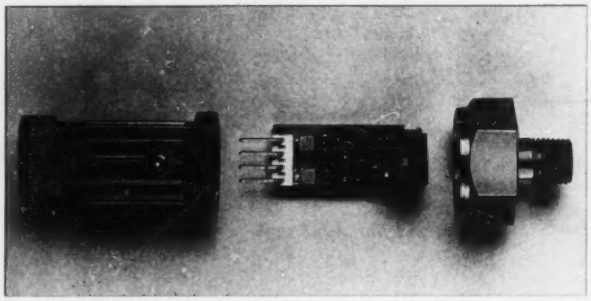
In a private interview with Automotive Industries *at Convergence '90, Nagayuki Marumo gave us some of his views on the automotive electronic industry:*

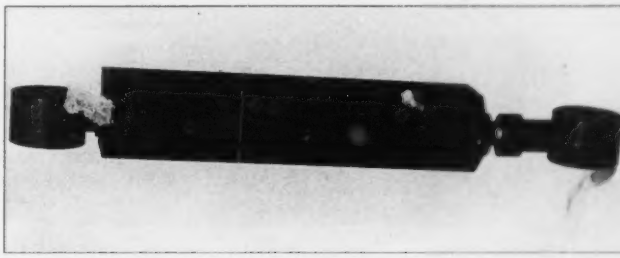
- *"The growth of automotive electronics will accelerate in the 1990s. The reasons for this will primarily come from the information technology that will be incorporated into vehicles, especially digital cellular telephones and navigation systems. As a result, the man/machine interface will become more natural."*
- *"Nissan has introduced a radar system for obstacle detection on large commercial trucks in Japan. It's not a microwave radar, it's a laser radar. When you get too close to the vehicle in front of you, it emits a warning. The next step is to have it automatically do the braking. But it's only on commercial trucks because it costs between $100,000 and $200,000. At the Nissan Central Research Lab we are working on a similar system for the blind spot at the side of the car where the warning will be displayed on the inside rear-view."*
- *"We think our magnetic navigation system will be one of the finest in the world. We have very precise software for map matching to compensate for errors. And we can improve this system in the coming decade, especially using GPS [global positioning satellites] as an assist. We tried using Loran-C at the Tsukuba Science Fair some years back, but were not satisfied with the results. It only has 300 meter accuracy. But, could GPS be closed off to public use during a war? This is a personal concern I have."*
- *"We believe automakers should do their own integrated circuit design in-house. And they should learn the processing, too. The reliability in electronics is critical, and there are many manufacturing factors that affect reliability. We must know everything about IC and LSI design and processing. The quality of electronics in the car is bad because we rely on the battery, so there are big electric spikes. As a result, we need very tough ICs, which require special processing*

Continued on p. 44

Acustar Electronic Oil Pressure Sensor

Acustar designed this generic electronic oil pressure sensor (EOP) (below) with all OEs in mind, not just Chrysler. Indeed, Chrysler may not be Acustar's first customer for it. The EOP features a piezoelectric sensor that converts pressure to electricity, which is then filtered and amplified for output to a gauge or lamp. Acustar sees a potential market for five million EOPs, but initial production in Huntsville, AL will start at 200,000 a year.





Nartron's New Position Sensor

Nartron Corp, of Reed City, MI, introduced a solid state, non-contact sensor called the Nartron variable Integrating Transformer (NvIT) (above). A custom output vs. position response can be "built" into an NvIT. This means that non-linear characteristics of a system requiring a position and/or speed measurement can be compensated for directly in the sensor, without the cost overhead of analog or digital computational electronics, says Nartron. The low cost NvIT is said to be ideally suited for adaptive suspensions, as well as other position and motion sensing applications.

Continued from p. 43

techniques. The IC makers don't like to change their processes, so they don't produce ICs that are optimal for automotive use, so we use commercial-grade ICs. There are some special ICs where we are doing the design and process design. We are starting to make chips to withstand high temperatures in the engine compartment, for multiplexing in doors and the IP, and we're doing switching ICs. Plus, we have other special ICs we are designing."

- *"At present we prefer silicon rather than gallium arsenide. Gallium arsenide has high-speed calculating and it can take high temperature, but the cost is very high. It's very unstable and has a high manufacturing reject rate. I think we'll have to study using GA if we use chips in the engine compartment or for high-speed processing. But this is something the electronics industry should develop for the automotive companies."*
- *"We're very interested in the application of fuzzy logic. We're developing it for cruise control to maintain the proper distance between vehicles. Fuzzy logic will become very important to achieve a natural man/machine interface. It is most important for the driver to feel comfortable. However, even fuzzy logic can't match the delicate control the human brain provides. But by the end of the decade we'll have supercomputers installed in the vehicle with one hundred times the speed today's supercomputers have."*

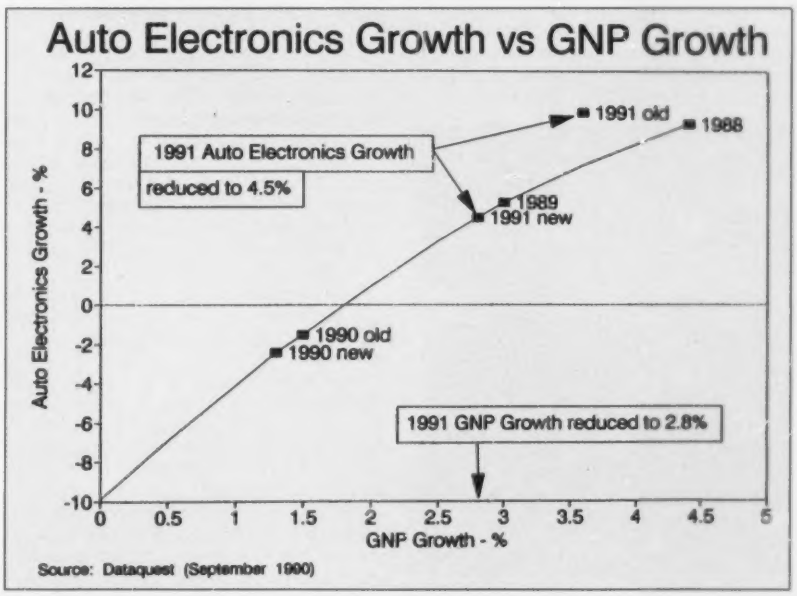
Jack Shaw
Chairman, Hughes Network Systems

By 1992 all US highways will have cellular coverage, says Jack Shaw, chairman of Hughes Network Systems. Now the big push should be converting to digital cellular phones. With the analog phones we have today it's fairly easy to listen in on conversations, he says. If you drive the same route everyday it's especially easy for someone to track down your calls. But digital, by its very nature, is much easier to make secure.

Beyond that, says Shaw, we should be looking at expanding personal communications. Portable cellular phones are one avenue. But he talked about having your own personal telephone number, possibly your social security number. Your phone calls would then be directed to the telephone nearest to you.

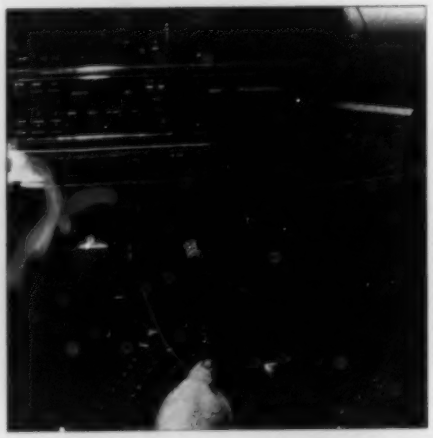
Dataquest Forecasts Downturn

Dataquest, the electronics forecasting firm, predicts automotive electronics growth will fall 10% to 4.5% in MY 1991. This will be partly caused by slow car sales, a shift towards smaller cars with less electronics, and increasing sales of transplant cars which use less electronics – for example, they don't have airbags or ABS.



Siemen's Ali-Scout

Perhaps the most effective IVHS demo at Convergence was Siemen's traffic management system called Ali-Scout (photo, next page). It's a Prometheus-funded navigation system that has been piloted in West Berlin for three years. With an on-board magnetic field sensor used for dead reckoning, a vehicle can keep track of its location. And with an infrared sensor located on the back of the inside rearview mirror, which communicates to beacons that would be mounted on existing traffic lights, a central computer system can keep track of Ali-Scout equipped vehicles.

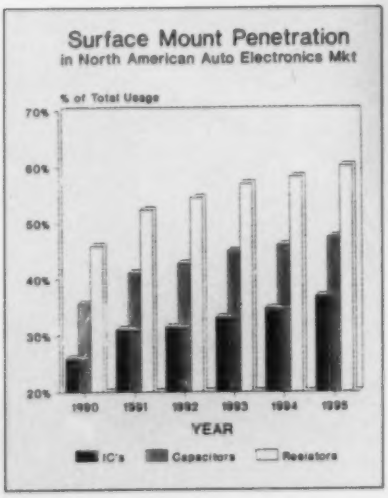


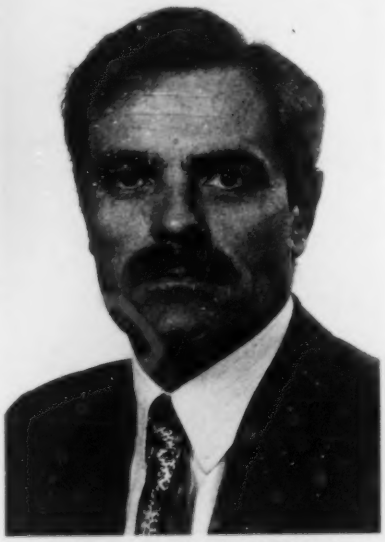
By programming your destination as x,y coordinates that are input from a hand-held remote, Ali-Scout will guide you to your destination. Directions to your destination come from both a directional arrow displayed on a small LCD panel (right center), and with voice directions that tell you which way to turn (speaker located directly behind rim of steering wheel).

With Ali-Scout, your directions to your destination would route you around traffic congestion. Siemens claims that based on the Berlin pilot study, if only 20% of vehicles used Ali-Scout, virtually all traffic snarls would be alleviated from metropolitan roads.

Surface Mount Devices To Grow

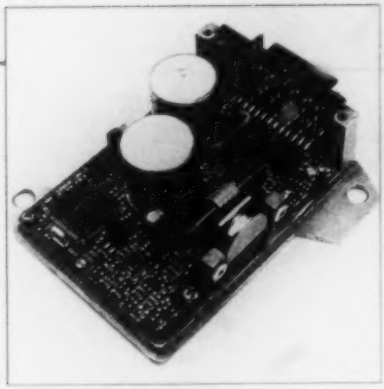
Surface mount devices will increase their penetration in automotive electronic systems through the mid-'90s, predicts M.H. Kitchen & Associates. Surface mounting refers to soldering electronic components directly to a printed circuit board (below), instead of pushing pins through holes in the board. Presently, surface mounting is more expensive than through-hole mounting, especially when low-cost off-shore labor is used. But prices of surface mounting are falling and will continue to do so as more integration and smaller packaging becomes more important, Kitchen predicts.





Convergence Appoints New Chairman

Bud Marx (above), executive director of Ford's Automotive Components Group, was appointed chairman of the 1992 Convergence show. He took over the reins from this year's chairman, Tim Leuliette, president of Siemens Automotive.



Bosch's Electronic Airbag Sensor

In the airbag field, Bosch remains true to the electronic, single-point sensor with its new Air Bag 6 (above).

AB6 can begin airbag deployment 20 milliseconds after the start of impact, claims Bosch; 50 ms after impact, the bag is fully inflated. An accelerometer and digital signal microprocessing (DSP) allow AB6 to monitor multiple crash parameters from a single point, and from within the passenger compartment. This central location eliminates external sensors, wires and connectors. The DSP's algorithm also includes multiple thresholds for belted and unbelted occupants.

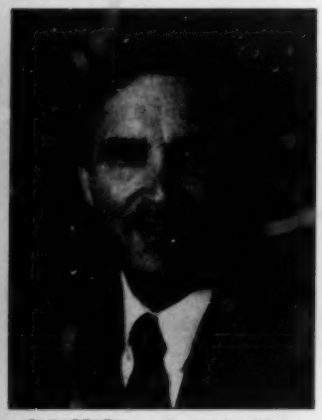
Other features include a Bosch-developed dual-element accelerometer instead of a safing switch, application-specific integrated circuits (ASICs or custom ICs), an energy reserve in case of vehicle battery failure, and a serial data link for diagnostics. AB6 weighs up to five lb less than electromechanical systems, says Bosch.

Analog Devices' Smart Sensors

Analog Devices and BMW have jointly developed a smart IC – the AD22001 (above) – that automatically detects failures in five lamp filaments, including headlamps. It detects a small threshold of 1.75 millivolts across a small shunt resistor in series with the lamp being monitored. Packaged in a 20-pin DIP, it consumes only 300 milliwatts of power and replaces a complex board-level design that carried over 80 discreet components. BMW will start using the lamp monitor in April 1991 on its 7-series cars. The AD22001 is available on the open market and is priced at $2 in quantity orders.

Analog Devices also announced it has developed a sensor that controls battery charging, allowing a higher charge in winter when more cranking power is needed, and less in summer when it's not. The sensor prevents the battery from overcharging. Presently, Analog Devices has no automotive customers for this sensor. AI

Excess Capacity...Again?



JOHN STARK is editor and publisher of Stark's Off-Highway Ledger in Chicago, IL.

Can heavy truckmakers prevent the excess capacity of the early '80s?

The downturn in the North American heavy truck business sounds like 'deja vu' to many industry officials. Truckmakers are once again faced with managing vital cash flow in a recessionary market. Hence, many firms are reassessing their current long-term use of assembly plant capacity.

Several companies are predicting that US and Canadian market demand for Class 8-type vehicles will recede to 140,000 units in 1990 and to 120,000 units in '91. Since heavy truckmakers are capable of building more than 176,000 vehicles per year at 10 plants in North America, production overcapacity obviously exists.

Some truckmaking officials believe heavy truck business may now be permanently overcapacitized by 20%. Perceived overcapacity could prompt the closing of one or more plants through 1991.

Assembly overcapacity is not new to the heavy truckmaking business. Prior crisis has restructured the industry. Foreign-based firms with deep pockets entered the market through corporate acquisition.

General Motors has been the industry's lowest user of heavy truckmaking capacity in place as late as 1988. It shed excess capacity late that year by permanently closing an assembly plant in Pontiac, MI, and spinning off its big truck business into a North American venture with Volvo of Sweden.

Mack Trucks, acquired by Renault Vehicles Industriels of France, has consistently ranked as the industry's second lowest user of capacity in place. Adverse financial repercussion of poor capacity use drove it into the waiting arms of Renault Vehicles.

Shortly afterward, Mack closed a truck assembly complex in Oakville, Ont., for three months and extended the plant shutdown for another three months due to an extremely weak Canadian market.

Volvo, which had previously ranked as the industry's third lowest user of available truckmaking capacity, sharply raised capacity utilization this year – even after it expanded truck assembly capability by 27% in 1989. Volvo opened a new production site in Orrville, OH, to handle increased market volume for Volvo GM joint venture trucks.

Other truckmaking companies are reasonably positioned to weather falling capacity use as market recession accelerates by keeping a tight lid on expansion plans.

For example, Navistar International used 117.9% of available capacity in 1989. Kenworth followed (108.6%), Peterbilt (107.8%), Ford (101.4%) and Freightliner (98.4%).

In 1990, production capacity use will be off for most manufacturers. Nevertheless, positioning within the industry should remain relatively unchanged. However, two truckmakers that have plans to add capacity may have to move those plans to the back burner.

Kenworth still plans to add another truckmaking site to its production network, replacing an aging facility at Seattle, WA. And Freightliner may open a fifth truckmaking complex in eastern Canada.

Ford, meanwhile, recently moved to consolidate truck assembly capacity at Louisville, KY, by relocating the output of Cargo-model midsize vehicles to the plant from a site in Brazil. Freightliner will close a medium-duty truck production facility at Hampton, VA, later this year and shift assembly to a complex in Cleveland, NC.

Heavy truckmakers appear determined to prevent the capacity woes of the early 1980s from repeating itself. Excess capacity is being reined in through astute asset management activity. Yet, one or two more plants may be permanently closed before it wins the latest round with market recession. ■

North American Heavy Truckmaking Capacity

	1990	1989	1988	1987	1986
Mack	38,000	38,000	38,000	38,000	46,000
Freightliner	33,000	28,000	28,000	28,000	28,000
International	30,000	30,000	30,000	30,000	30,000
Volvo GM	23,000	23,000	17,000	17,000	17,000
Kenworth	19,000	19,000	19,000	19,000	19,000
Peterbilt	17,000	17,000	17,000	17,000	17,000
Ford	16,000	16,000	16,000	16,000	16,000
General Motors	--	--	21,000	21,000	21,000
Total	176,000	171,000	186,000	186,000	194,000